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Datasheet for the decision of 3 April 2019

Case Number: T 0513/16 - 3.2.08

Application Number: 07700032.1

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Language of the proceedings: EN

Title of invention:
ROTARY CUTTING TOOL

Patent Proprietor:
Kyocera SGS Precision Tools, Inc.

Opponent:
Sandvik Intellectual Property AB

Headword:

Relevant legal provisions:
EPC Art. 56

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Inventive step

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Catchword:

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Case Number: T 0513/16 - 3.2.08

D E C I S I O N
of Technical Board of Appeal 3.2.08
of 3 April 2019

Appellant: (Patent Proprietor)	Kyocera SGS Precision Tools, Inc. 55 S. Main Street P.O. Box 187 Munroe Falls, OH 44262 (US)
Representative:	Eisenführ Speiser Patentanwälte Rechtsanwälte PartGmbB Postfach 31 02 60 80102 München (DE)
Respondent: (Opponent)	Sandvik Intellectual Property AB 811 81 Sandviken (SE)
Representative:	WSL Patentanwälte Partnerschaft mbB Postfach 6145 65051 Wiesbaden (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 22 December 2015 revoking European patent No. 1971456 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	C. Herberhold
Members:	M. Alvazzi Delfrate
	P. Schmitz

Summary of Facts and Submissions

I. The patent proprietor (appellant) lodged an appeal against the decision of the opposition division posted on 22 December 2015 revoking European patent No. 1 971 456.

II. In the appealed decision, the opposition division found, in particular, that the subject-matter of claim 1 of auxiliary request IVA filed on 19 October 2015 did not involve an inventive step in view of:

D5: US 4,963,059 A

in combination with:

D8: JP 63-86923

III. At the end of the oral proceedings before the Board of Appeal, held on 3 April 2019, the requests of the parties were as follows:

The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of auxiliary request IVA filed on 19 October 2015 (main request) or auxiliary request IVB, IVC or IVD filed by letter of 4 March 2019.

The respondent (opponent) requested that the appeal be dismissed.

IV. Claim 1 of auxiliary request IVA reads as follows (numbering of the features in bold added by the Board):

(M1) "An end mill rotary cutting tool comprising:

(M2) a body (20) having a cutting portion (24) and a shank portion (22);
(M3) a plurality of pairs of diametrically-opposed, symmetrical, helical flutes (30, 32, 34) formed in the cutting portion (24) of the body (20), wherein
(M4) the pitch between at least one pair of adjacent helical flutes (32) is less than or greater than the pitch of at least one other pair of adjacent helical flutes (34) in at least one radial plane along the axial length of the flutes (30);
(M5) a plurality of peripheral cutting edges (40, 42, 44) associated with the plurality of the helical flutes (30);
characterized in that
(M6) at least one of the peripheral cutting edges (42) has a radial rake angle different from radial rake angle of a peripheral cutting edge (44) of a different helical flute (30); wherein
(M7) the pitch between adjacent helical flutes (30) is variable along the axial length of the flutes (30); wherein
(SUB1) at least one pair of flutes (30) is formed at a constant helix angle; wherein
(M8) within each of the pairs of diametrically-opposed, symmetrical, helical flutes (30):
the radial rake angle of one of the peripheral cutting edges (42, 44) of a pair of flutes (30) is equivalent to the radial rake angle of the other peripheral cutting edge (42, 44) of said pair of flutes (30); wherein
(SUB2) at least one peripheral cutting edge (42, 44) has a positive radial rake angle."

Claim 1 of auxiliary request IVB differs from claim 1 of auxiliary request IVA in that feature SUB1 reads as follows:

"at least one pair of diametrically-opposed, symmetrical, helical flutes (30) is formed at a constant helix angle;"

Auxiliary requests IVC and IVD differ from auxiliary requests IVA and IVB respectively by the deletion of dependent claim 4.

V. The respondent argued essentially as follows:

Auxiliary request IVA - Inventive step

D5 disclosed all the features of claim 1 apart from the different rake angles (feature M6). It also disclosed the constant helix angle of pairs of diametrically-opposed, symmetrical flutes (feature SUB1) in Figure 3 which, as explained in column 3, related to the portion of the end mill actually utilised for cutting.

The differentiating feature solved the problem of reducing chatter and thus also improved stability. D8 addressed the problem of chatter and taught to solve it by the use of different rake angles. In view of the embodiments of D8, it would have been obvious to solve the problem according to present claim 1.

Therefore, the subject-matter of claim 1 did not involve an inventive step starting from D5 in view of the teaching of D8.

Moreover, there was a lack of inventive step starting from D8 in view of the teaching of D5.

Auxiliary requests IVB-IVD

Auxiliary requests IVB, IVC and IVD did not change the situation in respect of inventive step.

VI. The appellant argued essentially as follows:

Auxiliary request IVA - Inventive step

The claimed end mill was distinguished over that of D5 not only by the different rake angles (feature M6) but also by pairs of diametrically opposed, symmetrical flutes formed at a constant helix angle (feature SUB1). The latter feature was not clearly and directly derivable from D5 because Figure 3 did not show the whole length of the flutes but only about 2/3 of it.

The problem solved starting from D5 was not just to reduce chatter but also to maintain stability and provide further advantages, for instance, ease of production.

In view of this problem, the person skilled in the art would not have consulted D8. D8 related only to the reduction of chatter, a problem which, as apparent from column 1, lines 14-34, of D5, was already solved by the end mill of D5.

Moreover, none of the embodiments of D8 was in agreement with present claim 1. The embodiment of Figures 3-5 did not have a pair of flutes with a constant helix angle, since each flute had a different helix angle. The embodiment of Figures 6 and 7 did not have a variable pitch along the axial length since the pitches did not vary in the axial direction but only in the radial one. As to the embodiment of Figures 1 and

2, the pitches did not vary at all. The person skilled in the art would not have taken a feature in isolation from the embodiments of D8 because the properties of an end mill, in particular its tendency to chatter, were the result of the combination of its different features. Thus, even considering D5 and D8 together would not have led to the claimed subject-matter. As a consequence, the subject-matter of claim 1 involved an inventive step starting from D5.

As to the line of attack starting from D8 and combining it with D5, it was submitted for the first time at the oral proceedings before the Board and should not be admitted into the proceedings.

Auxiliary requests IVB-IVD

The amendments carried out in auxiliary requests IVB, IVC and IVD were intended to address objections of added subject-matter and did not change the situation in respect of inventive step. Thus, these auxiliary requests involved an inventive step for the same reasons explained for auxiliary request IVA.

Reasons for the Decision

1. Auxiliary request IVA - Inventive step

1.1 D5 discloses an end mill rotary cutting tool comprising a body having a cutting portion (10a) and a shank portion (10b) with a plurality of pairs of diametrically opposed, symmetrical, helical flutes formed in the cutting portion of the body (see Figure 1), wherein the pitch (called "flute width" in D5)

between at least one pair of adjacent helical flutes is less than or greater than the pitch of at least one other pair of adjacent helical flutes in at least one radial plane along the axial length of the flutes (column 3, lines 35-45 and Figures 2 and 3) and with a plurality of peripheral cutting edges associated with the plurality of the helical flutes (see Figure 1). The pitch between adjacent helical flutes is variable along the axial length of the flutes (column 3, lines 35-45). Moreover, the rake angles can be positive (column 9, lines 2-6).

Figure 3 of D5, referring to the same embodiment of Figure 1, shows that pairs of diametrically opposed, symmetrical flutes are formed at a constant helix angle. It is true that Figure 3 does not show the whole length of the flutes but only about 2/3 of their length. However, the sole reason for this is that this is the portion which is actually utilised for cutting (column 3, lines 26-33). Hence, the person skilled in the art would have had no reason to assume that a different angle was used in the portion not shown in Figure 3. On the contrary, in view of Figure 1, which depicts the whole of the end mill and does not show any variation of the helix angle, they would have understood that the flutes were formed at constant helix angles. This is in agreement with column 3, lines 6-11, which state that the two peripheral cutting edges 16a and 16c disposed in diametrically opposite relation are provided with "the" same helix angle θ1, and that the other two peripheral cutting edges 16b and 16d are provided with "the" same helix angle θ2, which is greater than the helix angle θ1. Thus, D5 also discloses feature SUB1.

1.2 In the end mill according to claim 1, contrary to what is shown in D5, at least one of the peripheral cutting edges has a radial rake angle different from the radial rake angle of a peripheral cutting edge of a different helical flute (feature M6).

In this way, chatter is reduced (paragraphs [0043] and [0044] and Figure 16 of the patent specification) without having to make all the features of the end mill different, which may be disadvantageous for the stability and ease of production of the end mill (paragraphs [0006] and [0008] of the patent specification).

The problem solved starting from D5 is thus the provision of an end mill with improved performance with regard to chatter, which is not impaired in its stability and which is easy to produce.

1.3 D8 (reference is made to the English translation D8a) relates to the reduction of chatter (page 3, lines 4-7).

Contrary to the opinion of the appellant, the person skilled in the art would have tried to reduce the level of chatter starting from D5, because chatter would have been a problem known to the person skilled in the art and there is no indication in this document that a (further) reduction of chatter is not possible. In particular, the passage cited by the appellant in D5, column 1, lines 14-34, cannot be understood to mean this since it merely describes a prior art end mill having helix angles different from one another so that circumferential pitches of the peripheral cutting edges are different from one another in any plane perpendicular to an axis of rotation of the tool body.

In this way chatter is reduced but manufacture is difficult and cutting performance is worse. Therefore, the person skilled in the art would not have been dissuaded by D5 from consulting D8.

The solution to the problem of improving performance with regard to chatter proposed by D8 is to have the radial rake angle of at least one peripheral cutting edge different from the others (page 3, lines 9-14, and claim). The three embodiments disclosed in D8 show how this can be implemented. In the embodiment of Figures 1 and 2, the end mill has a pair of diametrically opposed cutting edges with a positive rake angle α1 and another pair of diametrically opposed cutting edges with a different positive rake angle α2. In the embodiment of Figures 3-5 the end mill has a pair of diametrically opposed cutting edges with a positive rake angle α3 and another pair of diametrically opposed cutting edges with a negative rake angle -α4. In the embodiment of Figures 6 and 7 the end mill has a pair of diametrically opposed cutting edges with a negative rake angle -α5 and another pair of diametrically opposed cutting edges with a negative rake angle -α6. Since there is no indication that these solutions could impair the stability of the end mill or render it particularly difficult to produce, the person skilled in the art would have considered each of these possible implementations as an obvious solution to the objective problem above. Both the first and second embodiments of D8 exhibit an arrangement in which at least one peripheral cutting edge has a radial rake angle different from the radial rake angle of a peripheral cutting edge of a different helical flute, and at least one rake angle is positive. Hence, it would have been obvious to adopt the geometry of the rake angles as

stipulated in features SUB1 and SUB2 in the end mill of D5.

Contrary to the opinion of the appellant, the person skilled in the art would not necessarily have also adopted the other features of the embodiments of D5 (constant helix angles and pitches in the first embodiment and helix angles all different from each other in the second embodiment) because they are not part of the general teaching of D8, which is focused on the radial rake angles, a concept applicable, as shown in the examples, for different helix angles and pitches.

Hence, starting from D5, D8 renders it obvious to arrive at the subject-matter of claim 1, which, as a consequence, does not involve an inventive step.

Thus, there is no need to consider the admissibility of the further line of attack brought forward by the respondent starting from D8.

2. Auxiliary requests IVB-IVD

As agreed by all parties, the amendments to auxiliary requests IVB, IVC and IVD, which are intended to address objections of added subject-matter, do not change the situation in respect of inventive step. Thus, these auxiliary requests are likewise not allowable for lack of inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Moser C. Herberhold

Decision electronically authenticated